Bark, the protective tissue of a tree, covers the older above-ground and underground parts of the plant, where secondary growth occurs in thickness and replaces the skin in growing stems, roots and tubers. Extensive research on bark formation has highlighted the key roles of fatty acid biosynthesis, phenylpropanoid metabolism, and the synthesis of suberin, a complex glycerol-based polymer. Even though the bark biorefinery is currently in the initial stage of development, market and trend analysis has shown that interest in this material is increasing, so bark can be safely considered a material of the future. Currently, while wood bark extraction products are becoming more and more popular, **there is no view of the extraction waste from the processing of this material as an equally valuable raw material**. Therefore, the authors decided to take a more comprehensive look at the bark extraction processes, with particular emphasis on the omitted and underestimated post-extraction residues. The questions that the authors intend to answer as a result of the conducted research are: **1) What is the potential of waste from bark extraction? 2) Is cascade bark processing possible?** The hypothesis put forward assumes that it is possible and future-proof to develop a comprehensive cascade model for the processing of tree bark, and, consequently, for the effective and sustainable valorization of this raw material. Ultimately, such a model is intended to constitute a **theoretical knowledge base about the possibilities and limitations of bark biorefinery**. The tree species included in the project below are: *Betula*, *Picea* and *Pinus*. Extraction waste remaining from organosolv and alcohol-alkaline processes, including suberinic acids extraction, will be subject to detailed analysis to assess and understand its potential.

In the following project the **innovative approach is proposed, for the first time treating the main extraction product and residual one with the same significance and value**. This novel approach also assumes an **innovative, detailed determination of not only the composition but also the properties of the waste material, including lacking knowledge about possibilities and limitations of its valorisation**. The innovation of the research conducted will be on a European scale due to the species tested and cooperation with foreign institutions, but the idea of an innovative approach to bark biorefining will be on a global scale.

Wood bark contains a number of valuable ingredients, including structural elements such as lignin, suberin and cellulose, but also metabolites such as tannins, flavonoids and many others. In most cases, the post-extraction waste generated has no further use and is recycled for energy purposes or thrown away.

An alternative method to conventional methods of obtaining **lignin**: sulphite and sulfate, giving a product of higher purity and uniform structure, with more ecological extraction conditions, is the organosolv method. It involves the use of aqueous organic solvents, such as alcohols or ketones, in combination with organic or mineral acids as catalysts. Waste after lignin extraction using the organosolv method contains mixed extracts, suberin, hemicelluloses and other compounds, forming a condensed solid residue. The increased concentration of carbohydrates in the resulting solid residue provides valuable products for further use. Examination of the composition of the residual liquid formed after removing lignin from the solution obtained by the same method showed that the solution contained 5-hydroxymethylfurfural and furfural. Due to the valuable properties of these compounds, it is worth taking a closer look at them during organosolv extraction.

Valuable ingredients that can be extracted using the alkaline extraction method include **flavonoids**, including polymer flavonoids represented by condensed **tannins** or **phenolic compounds**. As a result of the production of high-purity tannin extracts from coniferous wood bark by alkaline extraction, a large-volume solid residue is formed, which is currently not widely used, represented mainly by polysaccharides and lignin. The share of polysaccharides reaches up to 50%, the main part of which are polysaccharides that are difficult to hydrolyze in water. The content of polysaccharides in this waste is higher than in the bark, therefore the mentioned waste can be considered a potential raw material for the production of cellulosic material.

As a result of **suberin** extraction, unused waste is generated, which has the potential to be further processed on a par with the obtained suberin, exhibiting similar properties. The waste remaining after extraction of suberin with ionic liquids, containing lipophilic particles, consisted of a mixture of resin acids, alkano-1-ols, alka(e)noic acids, terpenes and some oligomeric compounds. Resin acids present in waste are an interesting ingredient due to their antibacterial properties. **Suberinic fatty acids** isolated by depolymerization of suberin are becoming increasingly popular among researchers because they have antibacterial properties, protect against UV radiation and are highly hydrophobic. As it has been shown, waste from the extraction of these acids has smaller, but equally important properties of the acids themselves.

There is barely any mention in the literature of any existing attempts at cascading bark processing. Some researchers have proposed more sustainable ways to process bark in biorefineries through complex insights into its nature and structure. However, it seems that this topic is not taken into account when implementing knowledge and new practices on a larger scale.

The following project aims to assess the value, structure, characteristics and properties of identified tree bark extraction substances and by-products without finding the practical application. However, the results obtained should sustainably allow waste and by-products management in the future.